Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) ~~The~~ An internet protocol over wavelength division multiplexing (WDM) network structure comprising:

a plurality of ~~sub-ring~~ sub-rings each for connecting n number of terminals (where n is a positive integer) to which unique ~~user wave lengths~~ link wavelengths are respectively allocated;

a main ring for connecting ~~n~~ m number of ~~connection nodes connecting~~ the sub-rings (where m is a positive integer) via a respective connection node to which unique ~~user wave lengths~~ link wavelengths are respectively allocated;

a ~~single~~ sub-ring controller ~~connected to said single~~ for connecting an associated sub-ring ~~and~~ to said main ring through the connection node, and controlling the ~~flows~~ flow of packets ~~a packet transmitted/received~~ inside said sub-ring and the flow of packets ~~a packet transmitted/received~~ between said sub-ring and said main ring, the sub-ring controller using a unique wavelength that is different from the unique wavelength used in the terminal and connection node, the wavelength used in the main ring configured for use in each sub-ring; and

a main ring controller for controlling the flow of ~~a packet transmitted/received~~ packets inside said main ring,

wherein said terminals and connection nodes each add/drop only their own unique ~~wavelength signals~~ wavelengths,

said sub-ring controller ~~and main ring controller~~ configured to drop all the wavelength division multiplexed signals flowing in the sub-ring itself to de-multiplex the signals, a) to load each of said signals on ~~their~~ a unique ~~user wavelengths in their destination terminals~~ link wavelength assigned to its terminal by using a destination address that is included in the packet, and then ~~multiplex~~ multiplex again said signal to transmit to said sub-ring ~~and main ring~~ when the destination terminal is located on the sub-ring of itself, and b) ~~said sub-ring controller~~

~~adds~~ to add the identifying code (which is called a ~~λtag~~ λ-tag) ~~of~~ designating the sub-ring having a destination terminal~~, to the transmitted~~ of the packet, load the packet on its unique link wavelength assigned between said sub-ring controller and the main-ring controller, and then ~~transmits~~ transmit it to the connection node of said main ring when the destination terminal is located on the sub-ring other than the sub-ring having the source terminal of the packet,

said main ring controller configured to drop all the wavelength division multiplexed signals flowing in the main ring itself, extract the λ-tag information, switch incoming packets based on the λ-tag information, load packets on their unique wavelengths assigned to the respective sub-ring controller, and then transmit packets to the main ring,

each sub-ring controller and the main ring controller configured to transmit signals only in a uniquely defined direction.

2. (Currently Amended) The internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure according to claim 1, wherein the maximum number m of the ~~sub-rings connected to~~ connection nodes in said main ring and the maximum number n of the ~~terminals connected to~~ terminal in one sub-ring are the same (m=n), so that the n number of wavelengths ($\lambda_1 \sim \lambda_n$) ~~allocated~~ assigned to each of the ~~sub-rings~~ sub-ring in the main ring for connecting the respective sub-ring controller to the main-ring controller, and the same n number of wavelengths ($\lambda_1 \sim \lambda_n$) ~~allocated~~ assigned to each of the terminal in a given sub-ring are ~~shared~~ fully reusable, ~~whereby~~ resulting in the n^2 number of terminals ~~are supported~~ being interconnected by using the n number of wavelengths ($\lambda_1 \sim \lambda_n$).

3. (Canceled)

4. (Currently Amended) The internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure according to claim 1, wherein each terminal and connection node includes a wavelength coupler to add/drop only the assigned wavelength, said wavelength coupler ~~includes~~ including an input circulator, a fiber Bragg grating for reflecting ~~an~~ a unique user wavelength from a corresponding terminal and for passing other wavelengths, and an output circulator,

said input circulator transfers the wavelength division multiplexed signal inputted via said sub-ring to said fiber Bragg grating and drops the unique user wavelength from the corresponding terminal, that is reflected by said fiber Bragg grating,

said ~~output circulator transfers the signal added at the corresponding terminal to said output terminal of said fiber Bragg grating and transmits said signal along with the signal passed through said fiber Bragg grating to said sub-ring~~ wavelength coupler adds the same wavelength as dropped at the input of the wavelength coupler.

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5. (Currently Amended) ~~In a sub-ring controller, an~~ The internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure according to claim 1, ~~comprising~~ wherein the sub-ring controller comprises:

a sub-ring managing section including:

a de-multiplexing means for dropping the ~~wavelength division multiplexed~~ WDM signals ~~passing through~~ flowing in/from said sub-ring and for dividing them into individual ~~by~~ wavelengths ~~to de-multiplex the wavelength division multiplexed signals~~;

a routing means for ~~establishing the path of~~ routing the packets in the de-multiplexed ~~packet by the~~ wavelengths according to their destination terminals ~~terminal~~, using the destination terminal address included in the ~~packet~~ packets;

a packet grouping means for grouping the ~~packet for which its path is established by its~~ packets that have the same destination terminal;

a wavelength allocating means for loading said ~~packet~~ packets grouped by ~~its path~~ each of the destination terminals on the unique ~~user~~ link wavelengths of said destination terminals; and

a wavelength multiplexing means for multiplexing all the ~~wavelength~~ wavelengths into a single fiber of the sub-ring so that WDM signals containing the packets are transmitted to ~~transformation signals for all~~ the destination terminals ~~to transmit the multiplexed signals to said~~ in the sub-ring~~.~~, and

a main ring managing section including:

an optical receiver for receiving the unique user wavelength signal from said main ring through the connection node attached to the receiver;

a reframe means for synchronizing said received signal and for receiving the packet including CRC (cyclic redundancy check);

a λ-tag extracting means for extracting said λ-tag included in the received packet from the main-ring and transferring the extracted packet to the routing means;

a λ-tag attachment means for attaching the λ-tag identifying the sub-ring having the destination terminal according to the address included in the packet to be transmitted;

a frame means for framing the packet to be suitable for transmission through the network; and

a light transmitter for converting an electrical packets into optical signals with the wavelength assigned to the sub-ring controller.

6. (Currently Amended) An internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure according to claim 5, wherein said packet grouping means includes at least n number of buffers for storing the packets discriminated ~~by~~ according to their destinations ~~in~~ by said routing means.

7.-8. (Canceled)

9. (Currently Amended) ~~An~~ The internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure according to claim 1, ~~comprising~~ wherein the main ring controller comprises:

a λ-tag delineator for delineating a destination sub-ring ~~using~~ by extracting and reading information from the λ-tag added to the packets;

a λ-tag based switching section for ~~distributing~~ routing the packets by their ~~destinations~~ destination sub-rings according to the λ-tag ~~of the destination terminal~~;

at least n number of buffers, each buffer provided for a wavelength, respectively, for storing the packets distributed according to the destination ~~at~~ from said λ-tag based switching section;

at least n number of lead frame sections for reading the packets from each of the buffers and ~~for adding~~ restoring the λ-tag corresponding to said destination sub-ring, and framing the packet to be suitable for being transmitted; and

~~the~~ n number of the transmitters for ~~reading~~ converting the packets from each of said ~~buffers to transmit the packets with~~ lead frame sections into optical signals ~~having~~ wavelengths ~~allocated~~ assigned to ~~said destination~~ each transmitter.

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10. (Currently Amended) The internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure according to claim 1, wherein ~~said main ring~~ two or more of the unit network comprise a main ring and a plurality of sub-rings connected to the main ring ~~is extended~~ and constructed horizontally by connecting ~~n number of said connection nodes of said main ring and n number of connection nodes of another main ring by means of gateway controller~~ said main ring with another main ring by means of a gateway controller that performs transferring packets from a connection node belonging to said main ring to a connection node belonging to another main ring, and vice versa,

a transmitting part of said sub-ring controller adds to the packet to be transmitted to a sub-ring controller belonging to another main ring an identifying code (λ-tag) ~~of~~ designating the connection node ~~to a packet for transmitting~~ connected to the gateway controller, and then transmits it to a transmitting part of said main ring,

said gateway controller ~~transforms an~~ replaces the identifying code of said packet ~~into~~ by an identifying ~~codes of said connection nodes connected with~~ code designating a receiving part of said sub-ring, and then transmits it to a receiving part of said main ring.

11. (Currently Amended) An internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure according to claim 1, wherein a plurality of

intermediate rings ~~connected with~~ are inserted between the plurality of said sub-rings and the main ring, resulting in ~~make a structure of~~ a three-layer structure ~~by connecting with said main ring~~, said intermediate ring having intermediate ring ~~controller~~ controllers for ~~controlling a path of the packet transmitted from said~~ routing packets between two sub-rings belonging to the intermediating ring or between those belonging to different intermediate rings, respectively, through said main ring,

said sub-ring controller ~~adds~~ attaches the packet to the identifying code of the destination intermediate ring having a destination ~~terminal~~ sub-ring and a second identifying code of said destination sub-ring belonging to the intermediate ring, ~~to the packet for transmitting,~~ and then transmits the extended packet with two identifying codes,

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said intermediate ring controller confirms identifying code of ~~said~~ the destination intermediate ring included in the extended packet transmitted from ~~said~~ the source sub-ring, and if ~~a state of~~ the identifying code ~~is null~~ indicates the intermediate ring as itself, then said intermediate ring controller confirms the identifying code of ~~said~~ destination sub-ring, and then transmits said extended packet to ~~said~~ the destination sub-ring having said destination terminal on the other hand, ~~and~~ if the ~~state is not null,~~ destination intermediate ring identifying code indicates another intermediate ring than itself, then it transmits said extended packet to said main ring, and

said main ring controller confirms the destination intermediate ring identifying code ~~of said intermediate ring~~ included in the extended packet transmitted from ~~said~~ the source intermediate ring, and then ~~changes said identifying code of said intermediate ring into a null state, and then~~ transmits said extended packet to said intermediate ring having said destination terminal.

12.-16. (Canceled)

17. (Currently Amended) A method of transmitting/receiving packets in a sub-ring controller for controlling transmission/reception of the packets between any two of terminals, in an internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network

including the n number of terminals (where n is a positive integer) to which unique user wavelengths are respectively allocated, comprising the steps of:

~~if~~ dropping packets flowing in the sub-ring of itself, said packet transmitted from a source terminal ~~transmits packets~~ and containing destination terminal addresses ~~on their own~~ with a unique user ~~wavelengths~~ wavelength of the source terminal~~,~~;

routing ~~the paths of~~ the packets by ~~the destination terminal addresses~~ using the destination terminal addresses contained in the packets in order to delineate the packets by their destination terminal;

grouping the packets to be transmitted to each of the destination ~~terminals~~ terminal by temporarily storing the packets in a buffer allocated to respective destination terminal; and

loading the grouped packets on the ~~unique~~ assigned user ~~wavelengths of~~ wavelength to the destination ~~terminals~~ terminal and then transmitting the packets to the sub-ring, whereby said destination terminal ~~drops~~ receives said grouped packets by dropping its assigned user wavelength.

18. (Canceled)

19. (Currently Amended) The method of transmitting/receiving packets according to claim 17, wherein a plurality of connection nodes of sub-ring connected via a main ring along which the ~~path of the~~ wavelength division multiplexing signal transverses,

the method in said sub-ring controller for ~~adding~~ attaching an unique user wavelength information ~~(λtag) on~~ (λ-tag) designating the destination sub-ring to the packet to be transmitted from its own sub-ring to other sub-ring to transmit the packet to said main ring, includes:

a ~~λtag~~ λ-tag attachment step ~~of attaching~~ for attaching the ~~λtag according to the path of the packet determined~~ λ-tag to designate the destination sub-ring, which will be used at the step of routing the packet in the main-ring controller;

a ~~frame~~ framing step ~~of combining~~ for framing the packets with the ~~λtag with the packet to expand the packet as a determined transmission packet~~ λ-tag to make them suitable for being transmitted toward the main-ring controller;

a wavelength allocating step of loading the expanded packet on it own unique user wavelength; and

a light transmission step of ~~transmitting~~ converting the expanded ~~packet~~ packets into optical signals with assigned wavelength and for transmitting the optical signals ~~loaded on its own unique user wavelength~~ to the main ring.

20. (Currently Amended) The method of transmitting/receiving packets according to claim 17, wherein a plurality of connection nodes of sub-ring connected via a main ring along which ~~the path of~~ the wavelength division multiplexing signal transverses,

the method in said sub-ring controller for ~~delineating~~ detaching the ~~λtag~~ λ-tag from the ~~signal~~ packet received from said main ring to transmit the ~~signal~~ packet to the destination terminal, includes:

a light receiving step of receiving the unique user wavelength signal from said main ring;

a ~~reframe~~ reframing step of synchronizing the received signal and for ~~receiving~~ reading contents of the signal including CRC; and

a ~~λtag delineating~~ λ-tag detaching step of ~~delineating~~ detaching the ~~λtag~~ λ-tag to transmit the packet to the routing step.

21. (Currently Amended) The method of transmitting/receiving packets according to claim 19, wherein the main ring controller for receiving the ~~expanded~~ extended packet to which the ~~λ tag~~ λ-tag is attached from the source sub-ring to transmit the packet to the destination sub-ring, includes:

a λ-tag delineation step of delineating the destination sub-ring using the λ-tag contained in the packets inputted;

a λ-tag based switching step of distributing the packets by their destinations according to the λ-tag of the destination ~~terminal~~ sub-ring;

a buffering step of storing the packets distributed according to the destination sub-ring by ~~in~~ said λ-tag based switching step ~~on~~ into buffers;

a ~~reframe~~ reframing step of reading the packets from the buffers and ~~then for adding again a λ-tag corresponding to said destination~~ making them suitable for be transmitted to the destination sub-ring; and

a transmission step of ~~transmitting~~ converting the lead framed packets into optical signals with ~~optical signals having~~ wavelengths allocated according to each of ~~said~~ destination sub-rings.

22. (Currently Amended) An internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure comprising:

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the n number of terminals (where n is a positive integer) to which unique user wavelengths are respectively allocated;

a single controller for controlling the flow of a packet transmitted between two terminals; and

a ring network for connecting said n number of terminals and said single controller in a ring shape, wherein wavelength division multiplexed signals are transmitted along said ring network,

wherein said terminals each add/drop only their own ~~unique~~ assigned user wavelength signals among the wavelength division multiplexed signals transmitted via said ring network, and

said controller drops all the wavelength division multiplexed signals transmitted via said ring network to de-multiplex the signals, loads each ~~of said signals~~ packets on their ~~unique~~ assigned user wavelengths ~~in~~ according to their destination terminals, and then multiplexes again said signals to transmit to said ring network.

23. (Currently Amended) The internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure according to claim 22, wherein any one terminal belonging to said ring network and any one terminal belonging to other ring network are connected, the same unique user wavelength is allocated to said two terminals, whereby as

communication between said two ring networks are made possible via said two terminals, said ring networks are horizontally extended~~, respectively~~.

24. (Currently Amended) The internet protocol over ~~wavelength division multiplexing (WDM)~~ WDM network structure according to claim 22, wherein said terminals includes a wavelength coupler for ~~adds/drops~~ adding/dropping only its own ~~unique~~ assigned user wavelengths, said wavelength coupler ~~including an input circulator, a fiber Bragg grating for reflecting an unique user wavelength from a corresponding terminal and for~~ passing other wavelengths~~, and an output circulator, wherein said input circulator transfers the wavelength division multiplexed signal inputted via said sub-ring to said fiber Bragg grating and drops the unique user wavelength from the corresponding terminal, that is reflected by said fiber Bragg grating, and said output circulator transfers the signal added at the corresponding terminal to said output terminal of said fiber Bragg grating and transmits said signal along with the signal passed through said fiber Bragg grating to said sub-ring~~.